

Geographic Analysis of Patterns of Data to Target Efforts with Recruited Physicians



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Diane Chronis & Jifeng Ma

FMQAI

Objectives

- Overview of targeting methods
- Describe data analysis QIOs can use to identify geographic areas of their recruited physicians most in need of interventions
- Explain the use of correlation methodology
- Show effective ways to explain/present data
- Benchmarking

Overview of Targeting Methods

1. Mapping Quality Indicators
2. Correlation Analysis of Quality Indicators
3. Relational Plotting



Mapping Quality Indicators

by Targeted Area/Region

Basic geographic unit:

- State
- County
- Zip Codes

Composite geographic unit:

- HRR (Hospital Referral Region)/HAS (Hospital Service Area)
- PSA (Planning Service Area)
- Region (NE, NW, CE, CW, SE, SW)

Benefits of Using Regions

- Natural Reference
- Easy for Aggregation and Break-Down
- Homogeneity of Quality Indicators within Region
- Collaboration with Available Infrastructure

Mapping Quality Indicators by Geographic Location

Measure

- Absolute range (like 51% to 54%)
- Quantile (equal data points like top 20% etc)

Statistics

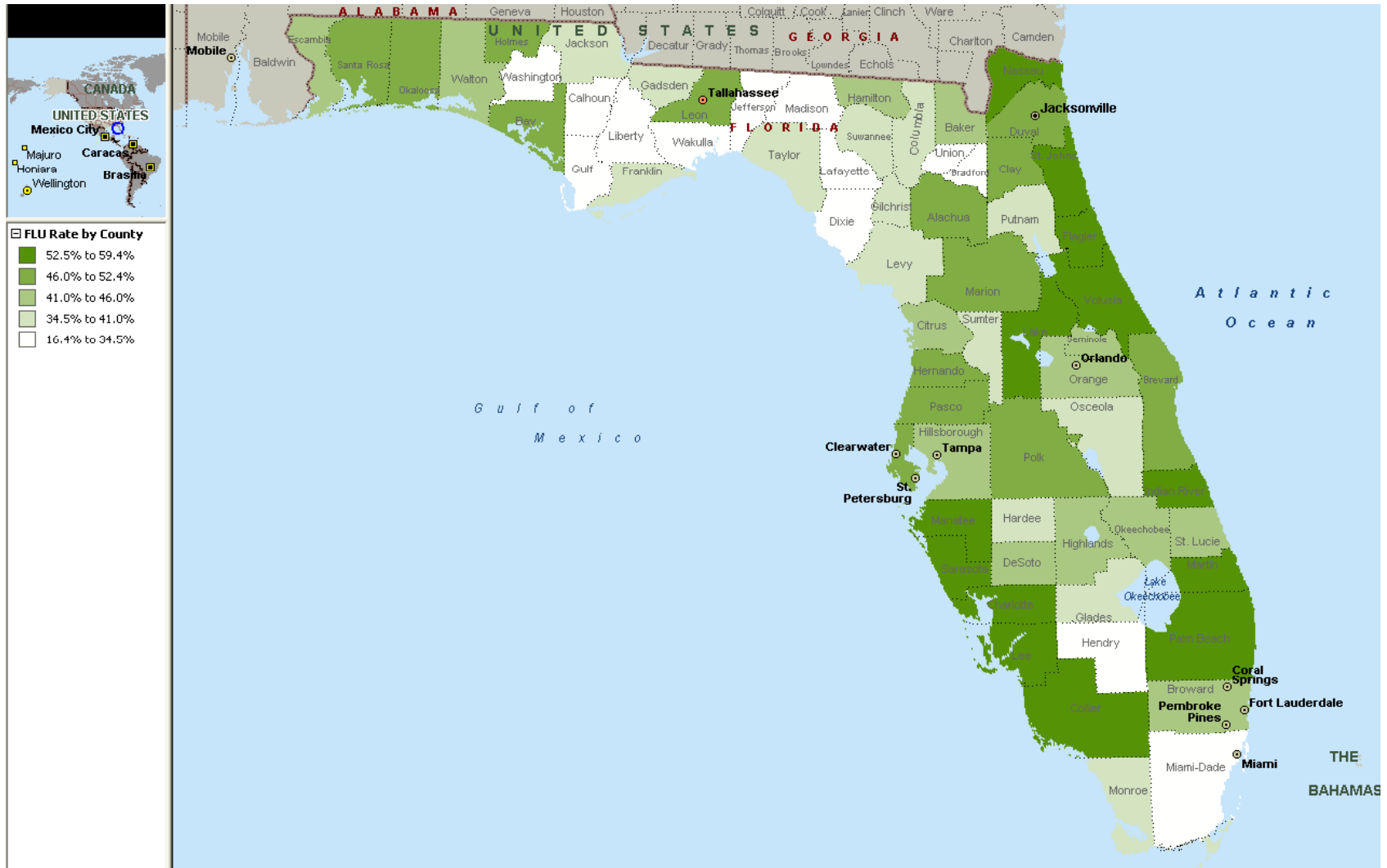
- P-value of difference significance

This presentation uses quantile

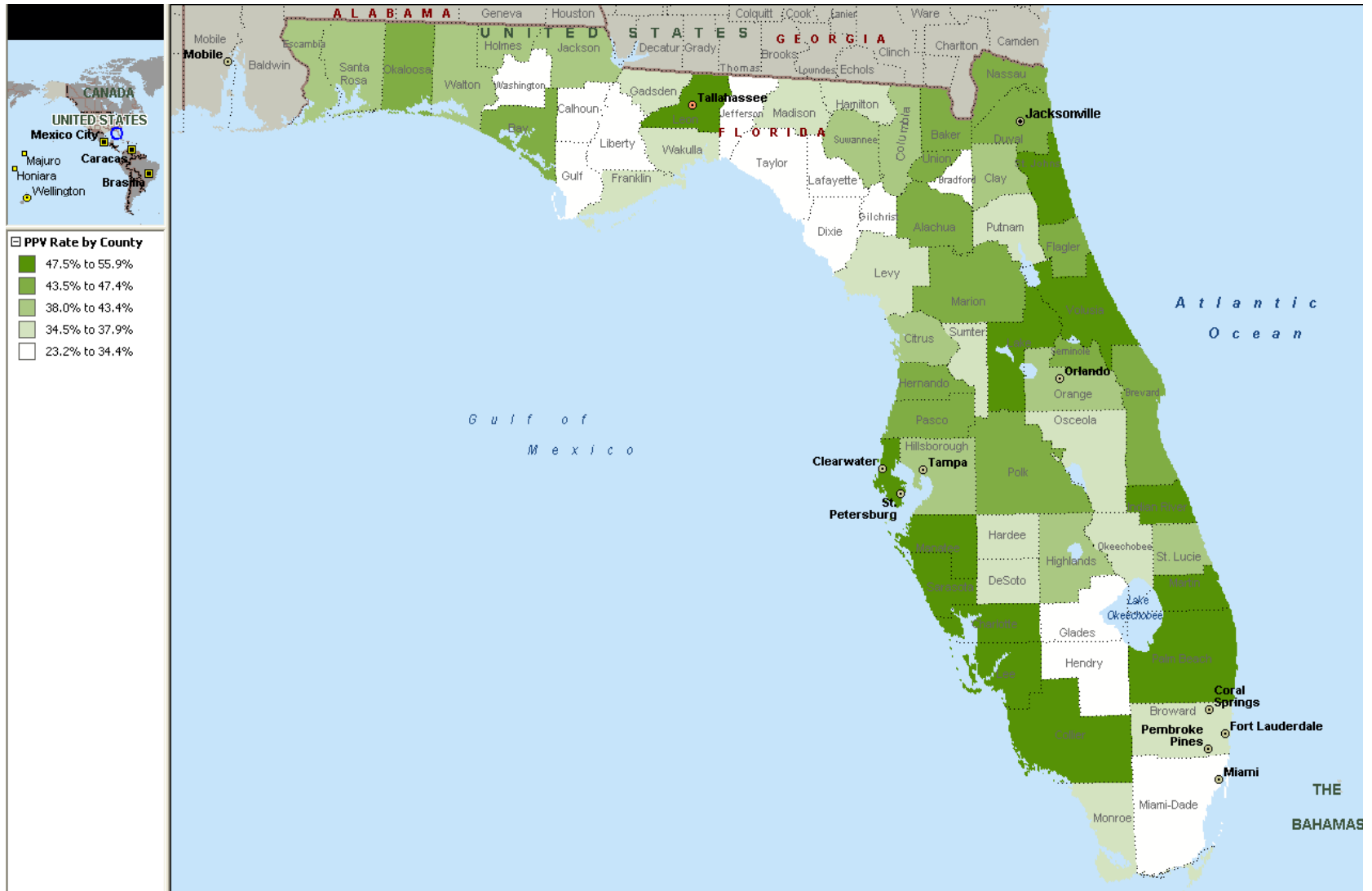
Prevention EHR Measures in 9th SOW

- Influenza Vaccination (FLU)
- Pneumococcal Pneumonia Vaccination (PPV)
- Mammography Screening
- Colorectal Screening (CRC)

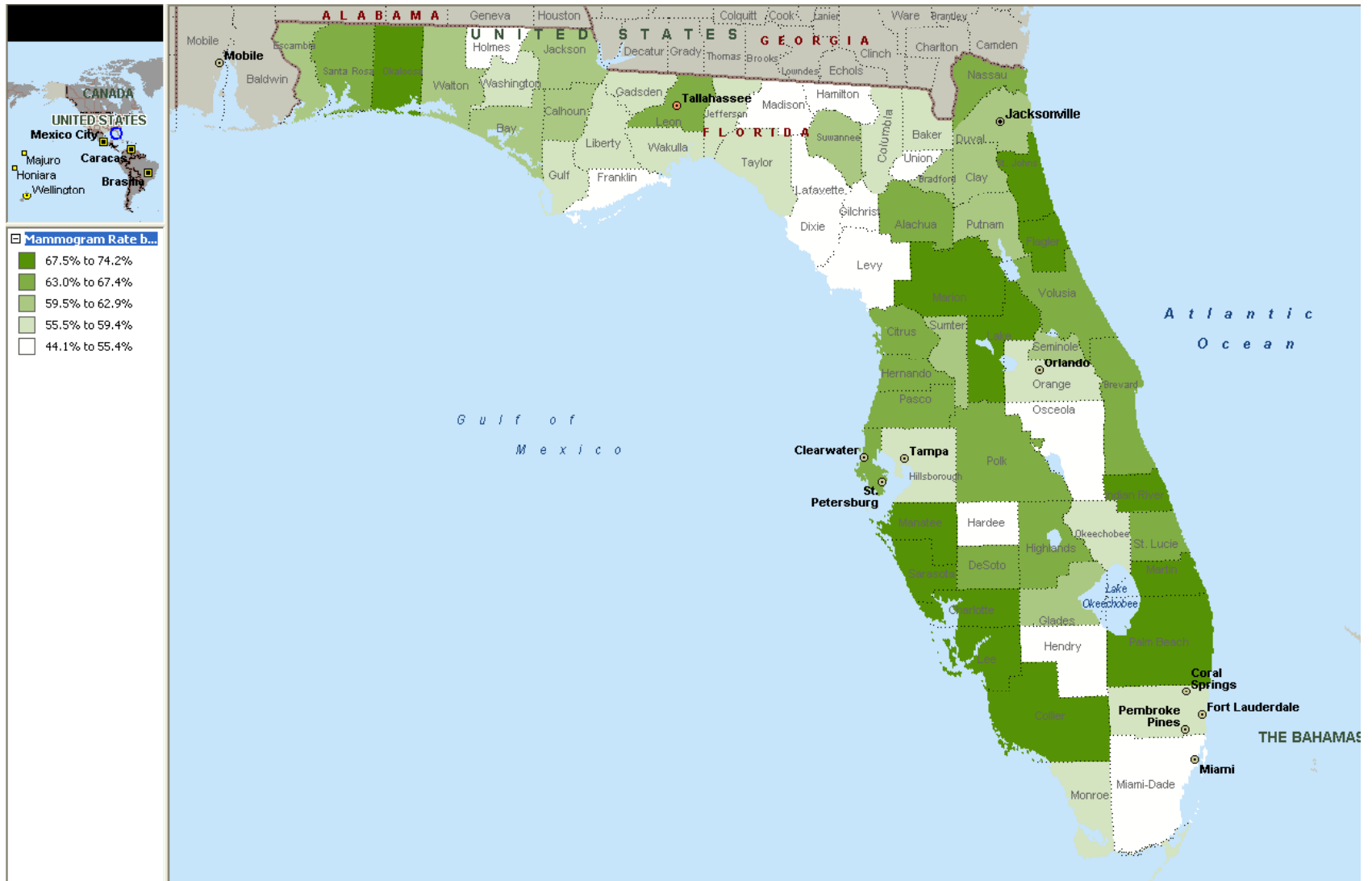
FLU Rate by County at Baseline (Sep.07 – Mar.08)



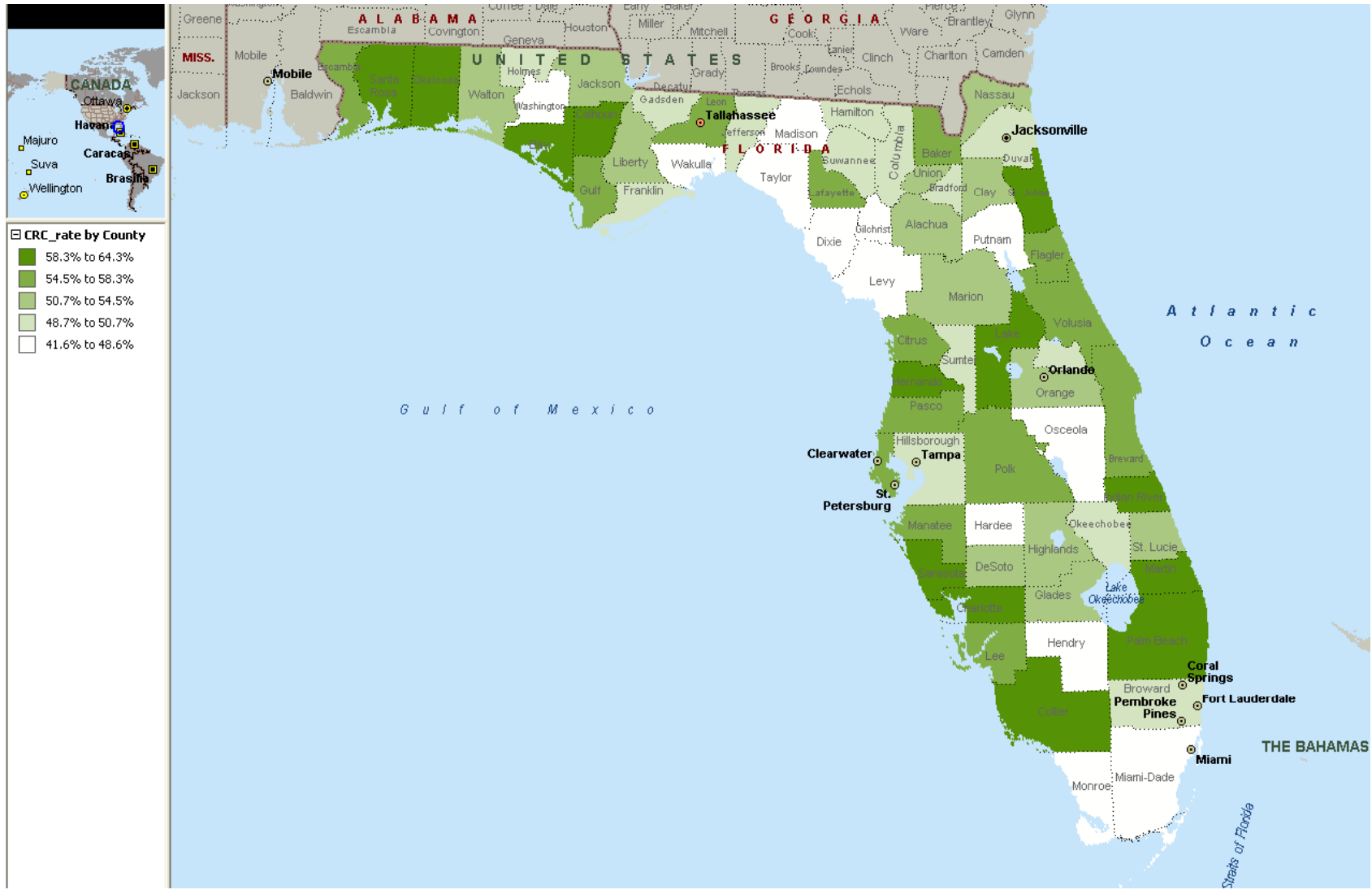
PPV Rate by County at Baseline (By Dec. 2007)



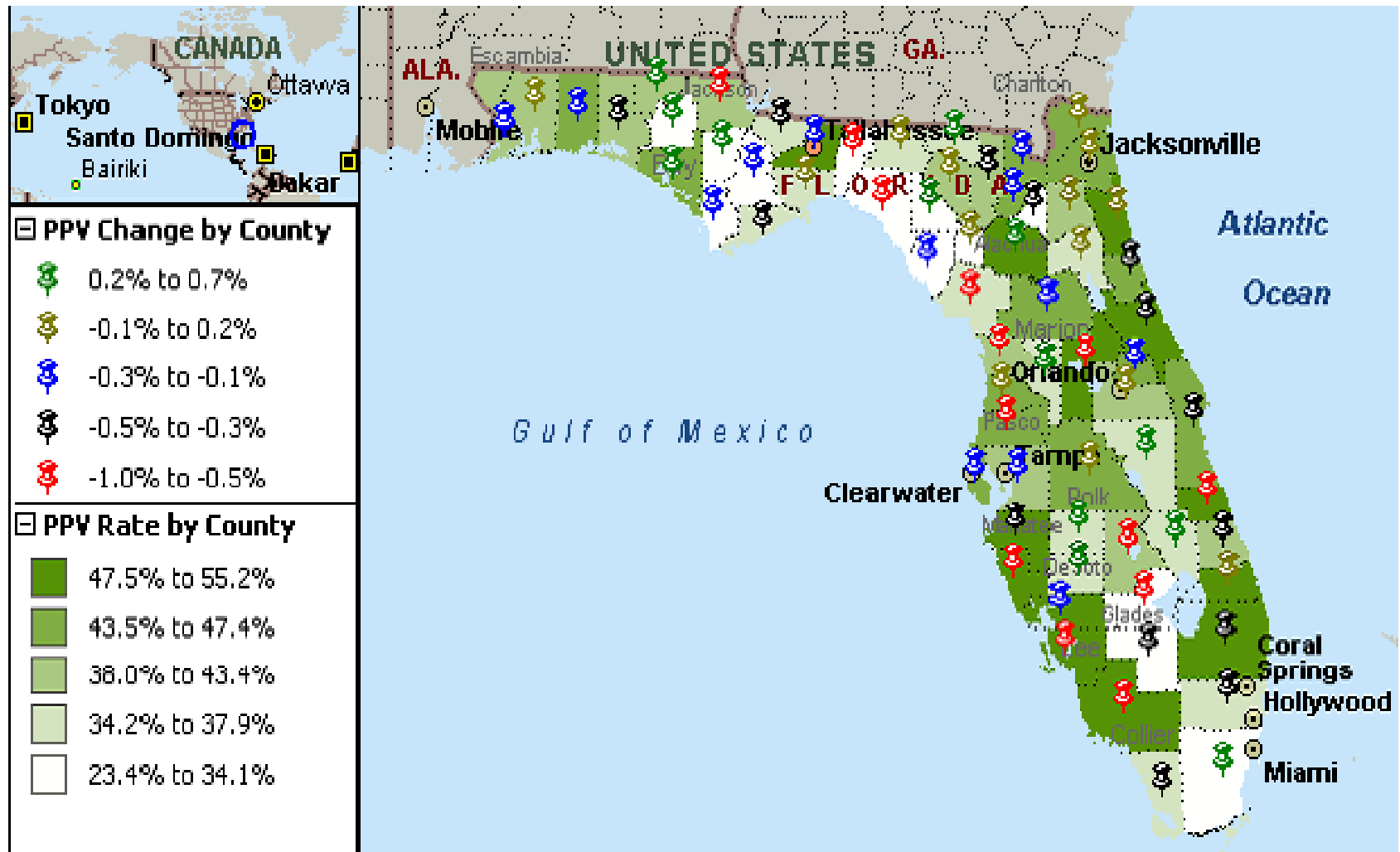
Mammography Rate by County (Jan. 06 – Dec. 07)



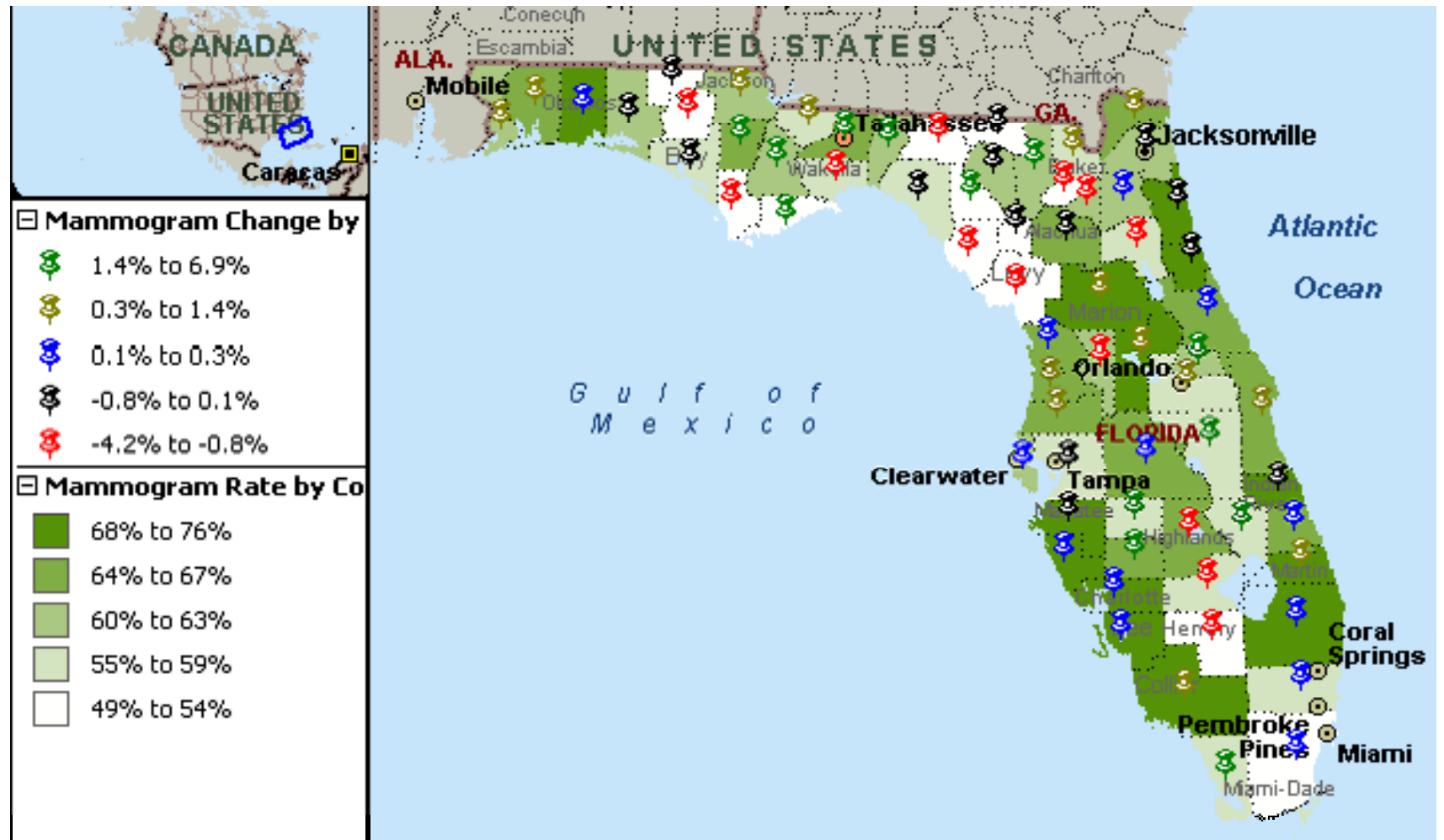
CRC Rate by County at Baseline (Jan – Dec 2007)



FL Medicare FFS PPV Rate by County during Jul2007 – Jun2008 & Change from Baseline



FL Medicare FFS Mammography Rates by County during Jul2006 – Jun2008 and Change from Baseline



Correlation Among Quality Indicators

- **Correlation** is a statistic to measure the strength and direction of a linear relationship between two data fields
- It shows how the amount of change in one variable corresponds to the amount of change from another variable
- Different from causal and effect analysis

Correlation Among Quality Indicators

By County Level

All four measures show strong association

- Influenza and PPV have the highest association ($r=0.86$)
- PPV and mammography ($r=0.77$)
- Influenza and mammography ($r=0.77$)
- CRC and mammography ($r=0.74$)
- CRC and PPV ($r=0.70$)
- CRC and influenza ($r=0.59$).

Correlation Among Quality Indicators

By zip code level

- Influenza, PPV and CRC showed larger correlations
 - PPV and influenza showed a near perfect correlation.
- Strong correlation on zip code level suggests targeting at the community level

Combining Quality Indicators

- Combine Screening Measures and Vaccination Measures by averaging them

Tip: If there are too many quality indicators, use Principle Component Analysis to combine them

Principle of Graphical Excellence

- Substance
- Statistics
- Artistic design
 - Visual evidence
 - Visual reasoning
 - Visual understanding

Reference: Edward Tufte, *The Visual Display of Quantitative Information*, 2nd ed., 2001, Graphics Press.

Effective ways to Explain/Present Data

ACCENT Method

- **A**pprehension: **Ability to correctly perceive relations among variables.**
Does the graph maximize apprehension of the relations among variables?
- **C**larity: **Ability to visually distinguish all the elements of a graph.**
Are the most important elements or relations visually most prominent?
- **C**onsistency: **Ability to interpret a graph based on similarity to previous graphs.**
Are the elements, symbol shapes and colors consistent with their use in previous graphs?
- **E**fficiency: **Ability to portray a possibly complex relation in as simple a way as possible.**
Are the elements of the graph economically used? Is the graph easy to interpret?
- **N**ecessity: **The need for the graph, and the graphical elements.**
*Is the graph a more useful way to represent the data than alternatives (table, text)?
Are all the graph elements necessary to convey the relations?*
- **T**ruthfulness: **Ability to determine the true value represented by any graphical element by its magnitude relative to the implicit or explicit scale.**
Are the graph elements accurately positioned and scaled?

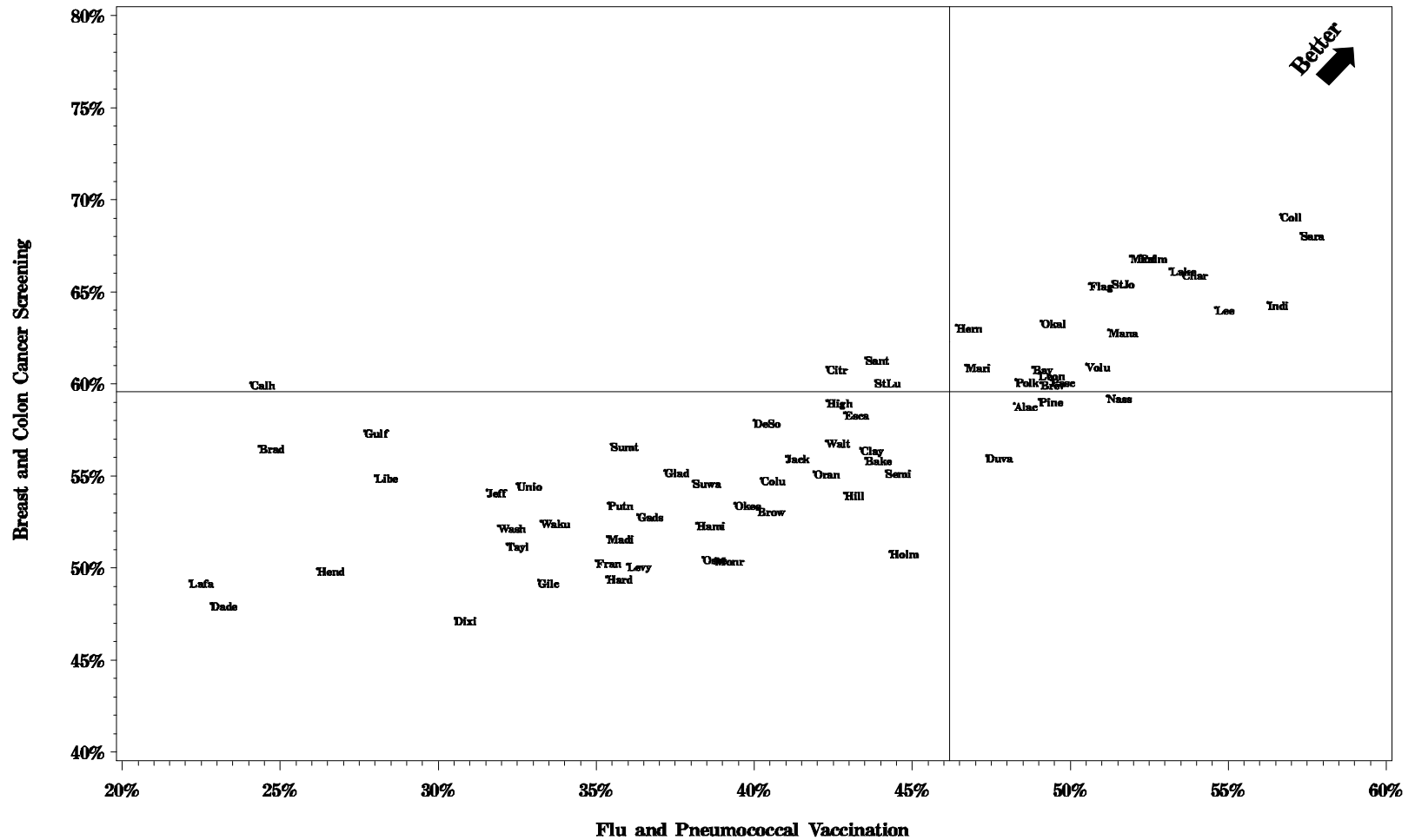
Adapted from: D. A. Burn (1993), "Designing Effective Statistical Graphs". In C. R. Rao, ed., *Handbook of Statistics*, vol. 9, Chapter 22.

Relational Plotting



Medicare Prevention Measures by County

Flu/PPV Immunization vs. Breast and Colon Cancer Screening

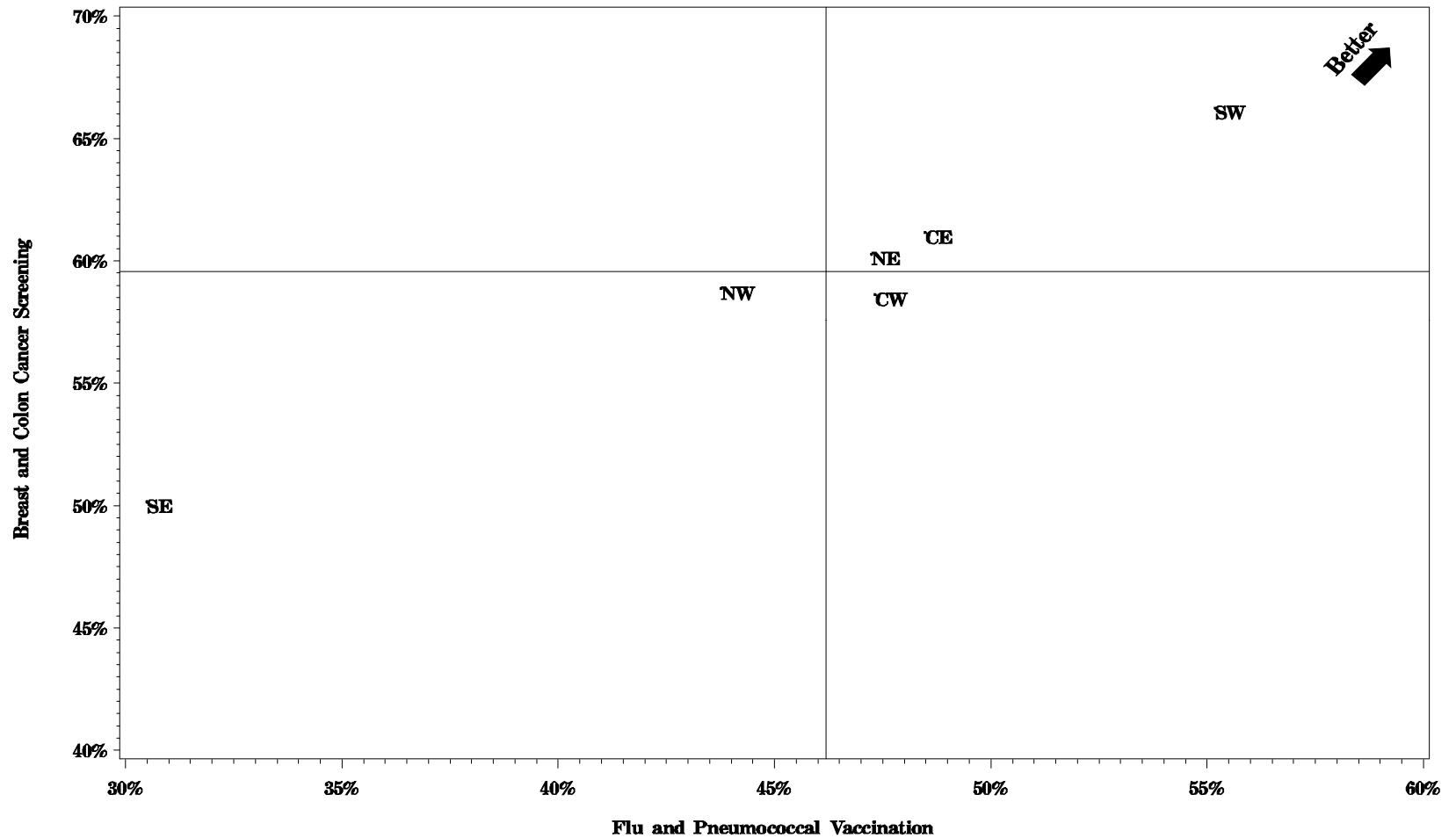


Prevention Core 6.3

FMQAI, Oct 2008

Medicare Prevention Measures by Region

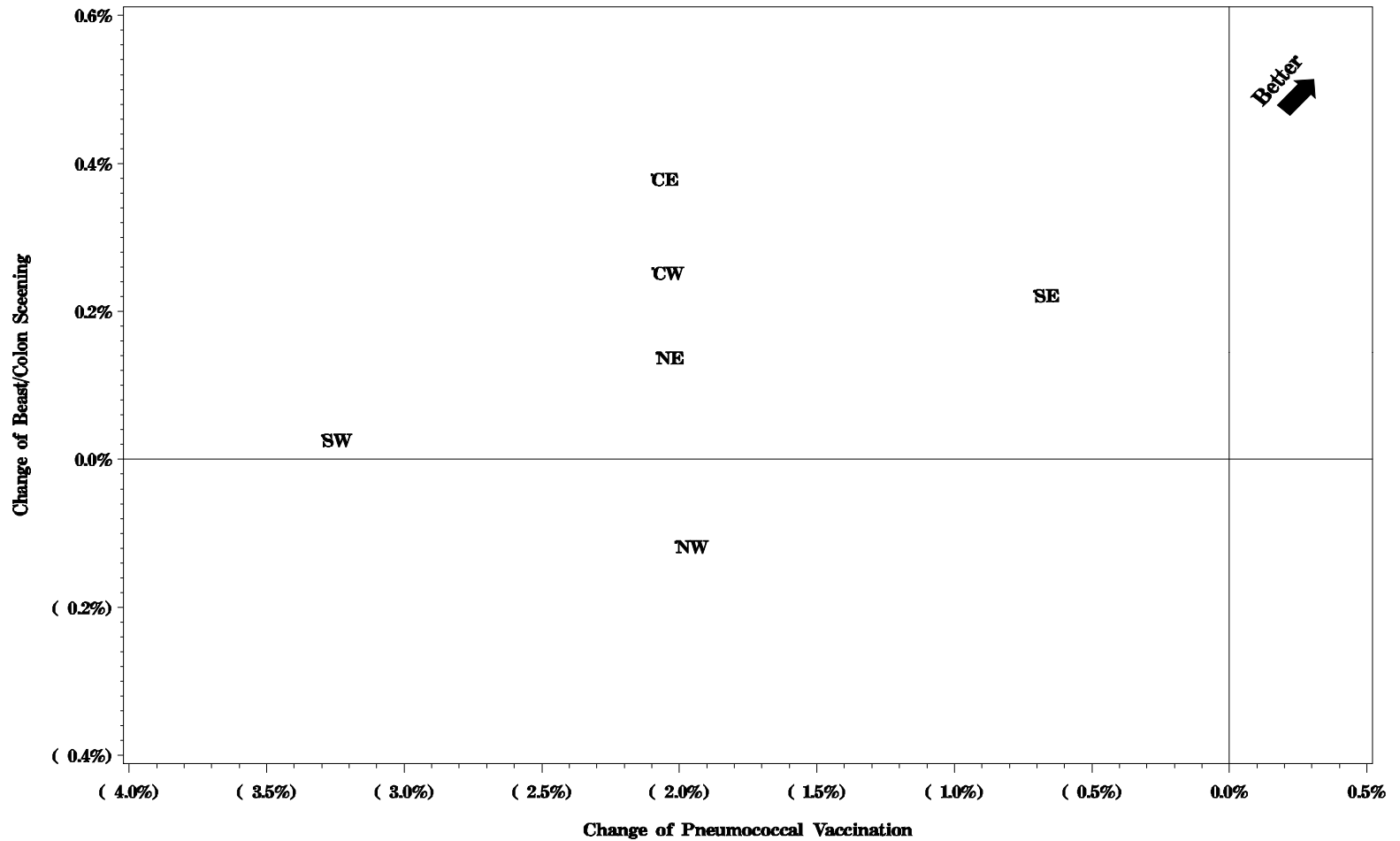
Flu/PPV Immunization vs. Breast and Colon Cancer Screening



Prevention Core 6.3

FMQAI, Oct 2008

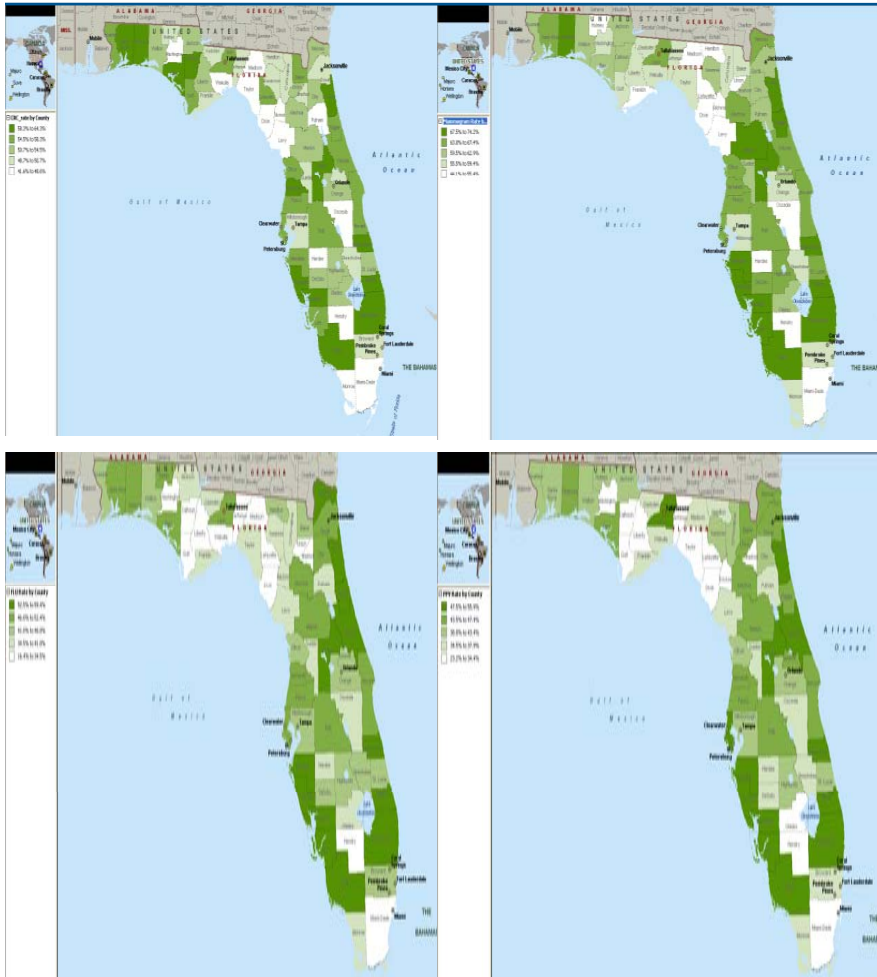
Change of PPV Immunization vs. Breast/Colon Cancer Screening by Region from Jan2007–Dec2007 to Jul2007–Jun2008



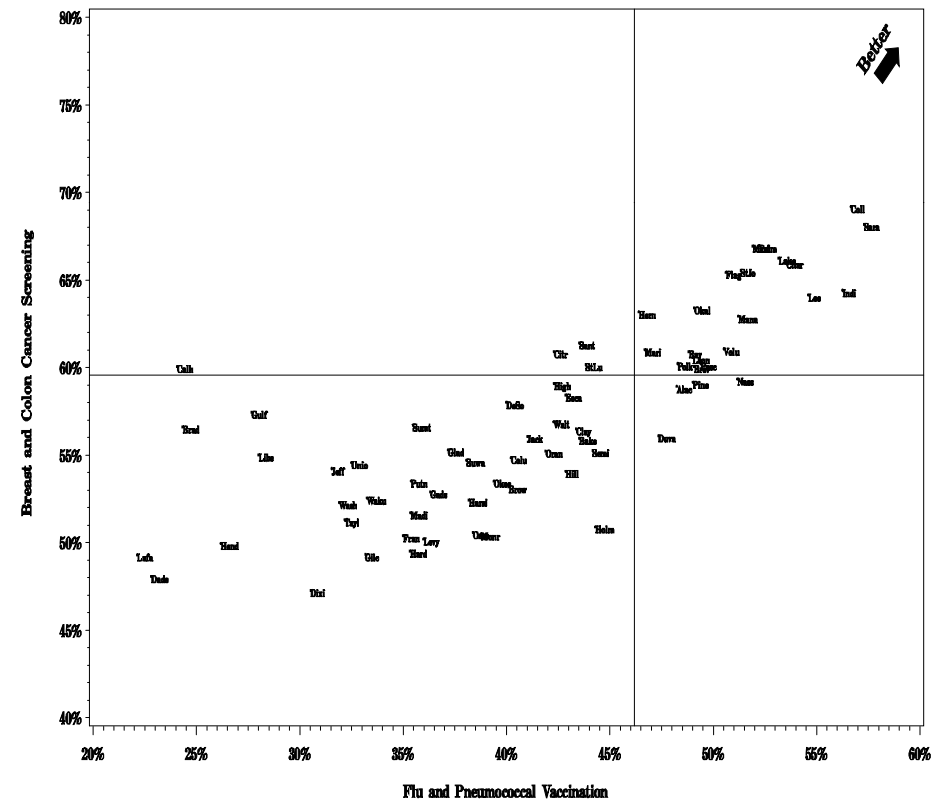
Prevention Core 6.3

FMQAI, Jan 2009

Comparison of Maps & Relational Plot



Medicare Prevention Measures by County
Flu/PPV Immunization vs. Breast and Colon Cancer Screening



Disparity



Quality Indicators for Disparity

- Disparity of care exists among locations
- Factors associated with disparity
 - Race
 - Age
 - Gender

Disparity on FLU Rate (Sep.07 – Mar.08)

Region	#Beneficiaries	%Rate	Disparity /Race	Disparity /Gender	Disparity /age (>=75) – (65-74)
ALL	1,895,534	48.0%	26.0%	3.5%	10.2%
CE	428,238	50.4%	25.7%	4.0%	12.6%
CW	355,239	49.1%	21.2%	4.8%	10.4%
NE	450,107	49.1%	18.4%	4.8%	8.0%
NW	142,418	45.7%	20.0%	4.7%	9.4%
SE	253,160	31.1%	20.3%	1.0%	12.5%
SW	265,530	57.9%	28.8%	4.0%	9.8%

Disparity on PPV Rate (By Dec. 2007)

Region	#Beneficiaries	%Rate	Disparity /Race	Disparity /Gender	Disparity /age (>=75)- (65-74)
ALL	1,805,061	44.4%	21.3%	4.1%	24.7%
CE	408,770	46.6%	20.6%	4.5%	26.9%
CW	338,108	45.5%	19.4%	5.3%	25.1%
NE	429,926	45.4%	14.5%	5.3%	23.4%
NW	136,754	41.9%	15.2%	6.2%	25.2%
SE	235,454	29.9%	16.1%	2.4%	22.2%
SW	255,254	52.5%	23.4%	3.9%	27.0%

Disparity on Mammogram Rate (Jan. 06 – Dec. 07)

Region	#Beneficiaries	%Rate	Disparity /Race	Disparity /age (>=65)- (<65)
ALL	223,345	64.3%	8.7%	15.4%
CE	46,387	65.6%	8.5%	17.4%
CW	41,278	63.6%	6.7%	15.6%
NE	59,188	66.0%	4.3%	15.8%
NW	21,254	61.5%	7.3%	13.8%
SE	27,887	54.4%	4.1%	6.1%
SW	27,267	72.0%	14.0%	19.4%

Disparity on CRC Rate (Jan – Dec 2007)

Region	#Beneficiaries	%Rate	Disparity /Race	Disparity /Gender	Disparity /age (>=70)- (<70)
ALL	1,484,581	54.8%	13.1%	3.9%	21.0%
CE	323,789	56.7%	13.3%	3.9%	22.9%
CW	273,044	53.6%	10.8%	4.8%	20.5%
NE	374,336	54.6%	8.4%	4.7%	20.0%
NW	126,291	56.3%	8.9%	4.6%	21.3%
SE	183,558	45.9%	11.8%	4.5%	18.2%
SW	201,398	60.5%	15.5%	1.4%	22.3%

Benchmarking

Definition

- Continuous process of comparing one's practices and performance measures with that of its most successful competitor(s).

Examples of Benchmarks

- Achievable Benchmark of Care (ABC)
- High Percentiles

Tip: Average (mean or median) or central measurement is not a suitable choice for a benchmark

Benchmarking

- Shows Direction
- Reachable Goals
- Relevance / Connection /Peers
- Simplicity
- Stability by Time

Benchmark Report for Providers

Measurement Rates and Benchmarks

Measurement / Area	Mammogram	CRC	FLU	PPV
ZipCode 99999	61.0%	51.4%	53.3%	47.8%
County Benchmark	73.3%	61.9%	59.8%	53.3%
State Benchmark	80.4%	68.5%	65.3%	58.0%

Questions & Discussion



Contact Information

Prevention

C/O FMQAI

5201 West Kennedy Blvd, Suite 900

Tampa, FL 33609

Diane Chronis

(813) 865-3558

dchronis@flqio.sdps.org

Jifeng Ma

(813) 865-3861

jma@flqio.sdps.org

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